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THE RELATIONS OF MEN, ANIMALS, AND PLANTS IN AN ISLAND COMMUNITY (FIJI)[1]

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THE problem of the ecological base of cultural phenomena is undergoing reconsideration by anthropologists from various points of view.[2] As part of this trend the present paper attempts to relate and interpret, from a total ecological viewpoint,[3] field findings of a geologist, a botanist, a naturalist and an anthropologist on an isolated community in Fiji.[4] Although the available data are limited, particularly as regards the botanical and zoological aspects of the problem, they seem to be sufficient to meet the needs of the present effort, which is designed to test the usefulness of a total ecological approach.

The community selected for study is located at the southern end of the Lau or Eastern Archipelago, a north-south belt of 100 small islands, 30 of which are inhabited. It consists of an isolated group of six inhabited islands and their uninhabited satellites.[5] Three inhabited islands, namely Fulanga, Ongea and Namuka, as well as all of the uninhabited ones, are composed of limestone. The other inhabited islands, namely Mothe, Komo and Kambara, are formed either wholly or in part of volcanic rocks.

No two islands are exactly alike in structure or mode of origin but in general the volcanic islands (e.g., Mothe) are eroded to rounded, reed-covered hills and gentle slopes or low, rocky promontories. They have miniature drainage systems which originate at high points near the central interior and form small streams with dentritic patterns. Their valleys are lined with relatively deep, rich soil which supports a variety of vegetation including yams (*Dioscorea*) and other garden crops.[6]

[1] I take this opportunity to thank Edwin H. Bryan, Jr., John Collier, Harry S. Ladd, Emma Reh, Ward Shepard, Albert C. Smith and Margaret Titcomb for help or comments on the manuscript.

[2] *See*, for example, Gayton, 1946; Hallowell, 1949.

[3] The term "total ecological viewpoint" is used to include the relations of organic species, including man, to one another in environmental context.

[4] The field projects on which this paper is based were unrelated and none of the researchers collected or analyzed their material systematically within a total ecological frame of reference. Edwin H. Bryan, Jr., naturalist, made a survey of the Lau group in 1924. Dr. Albert C. Smith, taxonomist, collected plants in 1934. Dr. Harry S. Ladd, geologist, studied the geology of Lau in 1934; and I investigated a culture-historical and culture contact problem in 1933–1934. Unless otherwise specified, conditions and institutions are described as of 1933–1934.

[5] The inhabited islands are Mothe, Komo, Namuka, Kambara, Fulanga and Ongea. The uninhabited islands are Karoni, Tavunasithi, Wangava, Marambo, Yangasa Levu, Navutu-i-loma, Navutu-i-ra, Yuvutha and Ongea Ndriki.

[6] Bryan (MSS.) states: "The dominant plant over much of the volcanic islands is a plume grass, *Eulalia japonica*, called *ngasau* by the natives. There are also several species of wiry ferns, including the "staghorn"; a low scrub, made up of about a half a dozen widespread species of

On the other hand, the limestone islands (e.g., Fulanga) have cliffs and forested low plateaus, which tend to erode into basins whose sharp-crested rims drop steeply to the sea. They have no valleys or streams, all the rainfall sinking underground and reaching the sea by an intricate system of subterranean caverns. Except in Namuka, where the soil is relatively deep, only a thin layer of rather poor topsoil occurs in pockets in the interior basins. Such limestone soil supports a distinctive flora. Useful hardwoods, such as the greenheart of India (*Intsia bijuga*), *mbau* (*Pittosprum brackenridgei*) and *makota* (*Dysoxylum richii*), as well as other jungle plants which are absent or scarce on the volcanics, flourish on the limestones of southern Lau. However, yams do not grow well in this type of soil. Apparently these islands had no horticulture before manioc and sweet potato (*Ipomoea batatas*) found their way to Lau in historic times.[7]

In sum, good garden land and food are generally limited on the limestone islands but plentiful on the volcanics, while forest products are scarce on the volcanics but abundant on the limestones. Thus, the resources of the two geological types complement each other, the fifteen islands forming a naturally balanced community or self-sufficient native trade area.

The foundations of this ecological arrangement extend far back in the geological history of the region. On the basis of paleogeological evidence, Ladd and Hoffmeister[8] infer that organic life in the island community under consideration began during the Lower Miocene before the Lau group had emerged above sea level, and it played a major part in the formation of the various islands and in laying the foundations for their present ecological structures. As soon as the islands projected above the level of the sea and the processes of erosion began to develop topsoil, we assume that the fundamental biotics of each island began to develop—limestone biotics on the limestones and volcanic biotics on the volcanics.

shrubs and stunted trees; and scattered *Pandanus* and *Casuarina*. The dominant littoral species are: *ndilo* (*Calophyllum inophyllum*), *vutu* (*Barringtonia speciosa*), *evu* (*Tournefortia argentea*), *evueve* (*Hernandia peltata*), *nawanawa* (*Cordia subcordata*), *tatang-ngia* (*Acacia lauriflora*), *vevendu* (*Scaevola koenigii*), *tavola* (*Terminalia littoralis*), *ndrala* (*Erythrina indica*), etc. Besides these there are the usual *Pandanus*, numerous vines and groves of coconut palms."

[7] According to Bryan (MSS.): "All the limestone islands . . . support one type of forest. It is made up throughout the group of the same fifty or so species of trees and tall shrubs, with an undergrowth of *Piper* (*wangawa*), bird's eye pepper (*rokete*), ferns, herbs and several vines. The luxuriance alone depends upon the size and elevation of the island. There is an interesting, rapid and progressive increase in the number of species and the height of growth, from the nearly bare rocks, such as Latei Viti and Bacon Island with but two or three species of prostrate herbs, to the splendid forests of Kambara, Mango, etc. First to appear after the herbs and vines are low, stunted trees of such widespread species as *Hernandia peltata*, *Tournefortia argentea*, and a *Ficus* with orange fruit commonly eaten by pigeons. A few of the small islands have native palms in considerable numbers. *Pandanus* and *Casuarina* appear early in the scale."

[8] Ladd and Hoffmeister, 1945; Ladd, 1934.

While we lack the data to describe these two types of biotics, we do know that their development in Lau has been influenced and limited by the following major factors.[9] First, rocks are of only two types: impervious volcanic and soluble limestones. Second, most of the islands are small, isolated, and closely surrounded by open sea at least 100 fathoms deep. They are separated from the main Fiji group to the northwest by a distance of some 200 miles and from Tonga to the southeast by some 400 miles. Third, located mainly between 17 and 19 degrees[10] south latitude and in the vicinity of 179 degrees west longitude, the Lau group has a tropical climate, the mean annual temperature being estimated at about 73 degrees Fahrenheit, the humidity range from about 70 to 90 per cent. Fourth, the islands lie in the belt of the southeast trade winds which prevail during the cool, dry season from April to November. This condition is strongly reflected in reef and island contours and in rock type distributions. During the remainder of the year, the warm, wet season, the southwest monsoon blows intermittently, especially from January to March when hurricanes may be expected. Fifth, practically all of the annual precipitation, which averages about 80 inches, falls during the wet season, much of it in the form of torrential downpours which erode basins and caverns in the limestone islands, and valleys in the volcanics. Sixth, the basic ecological balances of each island developed in the absence of large land animals, including man.[11]

By the time that the first men arrived in Lau in comparatively recent times, the delicately balanced, natural ecological arrangements, characteristic of southern Lau, had attained their basic patterns. The advent of man meant much more than the intrusion of a single species, namely *Homo sapiens*, as had been the case when many ocean- or air-borne species found their way to these islands. The advent of man meant the intrusion into the group of a whole complex of exotic species of both fauna and flora carried by man during his migration by canoe eastward into the Pacific basin. Culture-historical evidence in southern Lau[12] suggests that these included the pig, the dog, and the fowl, as well as various food plants such as yam, breadfruit and banana. Man brought, furthermore, various stone and shell tools such as adzes, gouges, awls and pounders with which he could somewhat alter the face of nature; various skills, such as fire-making, horticulture, stone-cutting, house-building,

[9] Ladd and Hoffmeister, 1945; Bryan, 1948; Thompson, 1940a, 1940b.

[10] Vatoa and Ono-i-Lau lie farther to the south, and accordingly have a slightly cooler climate.

[11] According to Bryan (MSS.): "Except for birds and insects there is a poverty of native animal life in Lau. The only mammal noted was the rat. About a dozen species of water birds and over 28 species of land birds were encountered throughout the group. Two species of land snakes and one banded water snake were caught. Lizards of various species were abundant. The largest was the green *vokai*. Various sizes of geckos and skinks were more abundant. Land crabs, including the large 'coconut' crab and hermit crabs, were present in quantity."

[12] Thompson, 1938.

basketry and mat-plaiting; and he brought the sailing canoe with which he traveled between the islands and connected their heretofore disparate ecological arrangements.

Not much is known of these first human inhabitants of Lau but, on the basis of internal evidence in the present-day culture and of archeological findings,[13] we infer that they settled on the larger islands and formed small clan hamlets in the bush. On the limestone islands the aborigines subsisted chiefly on jungle fruits, edible green leaves from the bush, fish, pigs and fowl, while on the volcanics this basic diet was supplemented with such garden produce as yams.

After the first men arrived, a new ecological arrangement seems to have gradually taken form on the basis of the old; and recently introduced species of flora and fauna, including *Homo sapiens*, became a part of the total balance. The culture of the first human inhabitants of Lau indicates that, on the foundations of attitudes and behavior patterns which they had brought with them into Lau, the aborigines developed a culture which integrated the human group with the other species of the natural community in environmental context and which symbolically explained, validated and supported the group's way of life.[14] What the effect of the aborigines was on the environment we do not know. It has been suggested, however, that man's cultivation of the volcanic islands has been responsible to some degree for the fact that much of their flora has degenerated to rank grasslands and other low growth. The limestone localities, on the other hand, apparently were and still are less affected by man's presence. The soil is less fertile and less responsive to cultivation of food plants by means of technology available to the natives, while the low, dense, scrubby forest, its tangle of underbrush, together with the rough, pitted terrain, help to discourage change through human activity.[15]

The next major event in the culture history of the area was the conquest of the aborigines, apparently about fifteen generations ago, by a small band of warriors reputed to have come from northwest Viti Levu in west Fiji. Marrying aboriginal women who brought them parcels of land, the conquerors settled on the more fertile islands and founded new clans. The newcomers were very different in skills, interests and values from the aborigines. They were a raiding, fishing people who preferred to sail and gather their food from the sea rather than to till the soil. The conquerors, moreover, were fascinated

[13] Thompson, 1938, 1940b.

[14] In time apparently the migration of their ancestors from the west was forgotten and the aborigines of Lau came to believe that they had originated locally in some natural phenomenon, such as a tree or an animal. The people of each island also had a species of bird and a species of fish which was sacred to them, and they believed in a local abode of the dead. Their deity was apparently a great, pervasive, spiritual power believed to be the source of all *mana* and was worshiped at sacred places such as caves, trees or stones.

[15] Bryan, 1948.

by their genealogies and by the idea of rank based on male primogeniture and they introduced ancestor worship into Lau.[16]

The aborigines and their descendants, however, kept most of the land, their food-producing patterns, and their basic ecological adjustment to the environment. They also kept their nature religion, related to that adjustment, and many of their traditional attitudes and values. In time manioc and sweet potato, exotic food plants which made gardening possible to a limited extent on the limestone islands, found their way into Lau, allowing an increase in food production and population. Gradually, on the basis of ancient structures, the ecological and cultural pattern of the area developed a new balance. Although Tongan and European influences have somewhat altered it in recent years, in that warfare has ceased and most of the Lauan religious practices have been lost due to missionary influences, the basic structure of the ecocultural arrangement apparently persists to the present in southern Lau.

Space would not permit a complete description of Lauan culture from the total ecological viewpoint even if the available data allowed it. It will suffice for our purpose to note certain aspects of the productive and distributive system in ecological context. The food problem looms large in this community on account of many interrelated factors. Among them are the frequency of drought and destructive hurricanes in the area, the scarcity and poor quality of garden land on the limestone islands, the fact that most manioc (staple of the limestones since its introduction) is inedible before it has been processed by a tedious operation to remove the poison, and the difficulty of preserving and storing food in the tropics under native conditions.

Under such circumstances we might expect the diet of the Lauans to be deficient both in quantity and in nutritional balance. No systematic studies of diet have been made in this area, but we note that to be satisfactory from the native viewpoint, a meal, or a feast must consist of two parts: 1. steamed "true food" (called *kana ntchina*), namely a staple such as yam, breadfruit, sweet potato, manioc, or Tahitian chestnut (*Inocarpus edulis*); and 2. a boiled relish (called *mboro*) made of fresh green leaves, fish and coconut "cream," seasoned with bird's eye pepper. Pigs and sea turtle are feast foods. This pattern of diet requires little or no fresh water in a community where fresh water is exceedingly scarce, another adaptation to the environment. Moreover, it appears to be well-balanced from the nutritional viewpoint, the "true food" providing the bulk of carbohydrates, some proteins, fats, minerals and vitamins, while the relish furnishes proteins of superior quality and fat (i.e., from

[16] They set their clans up over those of the aborigines as a noble class, each clan having three species sacred to it, namely a tree, a fish and a bird. They required that their first-born males be regarded as sacred chiefs and be rendered tribute by the people in the form of first fruits. They developed a system of worshiping their warrior forefathers by means of hereditary priests in small temples.

ripe coconut "cream,")[17] as well as certain indispensable vitamins and minerals found in fresh green leaves and red peppers. Furthermore, although food does not drop off the trees and rot on the ground (as it does on many Pacific islands—e.g., in Guam before the last war), the Lauan diet appears, under native conditions, to have been relatively adequate in quantity except in time of hurricane or drought.

The traditional diet of the Lauans is the result of a complicated and ingenious structure of attitudes, habits and institutions which function to develop and reinforce the basic ecology of the area according to the needs of its population, and to relate and adjust the community as a whole to the total environment. To gain some insight into this structure, let us begin with the daily menu. The Lauans eat only one main meal a day, at about sundown, and the major activities of both sexes are directed toward procuring and preparing the food for this meal. The men and boys of the household are responsible for the daily supply of "true food" for their own group and this they either raise in the household's garden land or collect from the bush. They then carefully prepare it, wrap it in leaves, place each package of food in the earth-oven pit on stones which have previously been heated, cover the whole with leaves and earth, and allow it to steam for at least an hour. The women and girls of the household, on the other hand, are responsible for the relish. They collect fresh green leaves daily—either edible leaves from the bush or sweet potato leaves from the garden. The women also collect shellfish on the reef or fish with nets in the lagoon and they clean the catch on the beach. Then, at the household kitchen huts, they pick leaves from stems, grate and strain the fatty flesh of ripe coconuts to make coconut "cream," and boil the mixture with fish and pepper in pots for at least an hour over a wood fire.

When both parts of the meal, the "true food" and the relish, are finally ready, they are combined and divided into shares, one for each member of the household according to rank, age and sex. Thus the two parts of the daily meal are always procured and prepared separately. Indeed, no woman is allowed near the earth-oven, which is strictly a male domain located some distance from the kitchen hut. This complementary and balanced sexual division of the rather time-consuming labor of meal-getting functions effectively toward insuring that the daily diet will be reasonably adequate, varied, and sufficient

[17] The proximate composition of "coconut cream" is: protein, 3.55%; fat, 33.15%; carbohydrate, 8.62%; calories per 100 grams, 347. (Concepcion, 1947). On this point, Emma Reh, nutrition officer, Food and Agriculture Organization of the United Nations, writes, "The protein content of 'coconut cream' is fairly high considering this is a liquid product. The protein is of good quality, like proteins of pulses, oily seeds and nuts, and superior to those of cereals, starchy roots and other vegetable foods. It is rich in most of the amino acids essential in nutrition. The fat content of the 'coconut cream' is also high, but the fat is low in the unsaturated fatty acids needed by the body. The requirements are however small, and probably met by fats contained in other foods." (Reh, 1948).

in quantity to fulfill the needs of the group, without placing undue burden on either sex or on any one individual. The method of sharing the feast tends toward a systematic, equitable distribution of food within the household group.

Now it should be noted that, for the self-maintenance of this diet pattern, each household must have access to three types of resources: namely, garden land, bush, and fishing grounds. With this point in mind, let us glance at the system of land use in southern Lau.[18] After the British took over the Fiji Islands in 1874 and peace was established between native factions, the clan-hamlets moved out of the interior of the Lau islands and settled on adjacent lots on the windward[19] shores, forming coastal villages. But they kept their ancient land divisions and proprietary clan rights. Volcanic islands like Mothe were divided into pie-shaped sections bounded by natural ridges which separate the fertile valleys, and each clan had the use of the garden lands, uplands, and fishing grounds of the section wherein its hamlet had formerly been located. On limestone islands like Fulanga where the valley and ridge conformation is absent, land sections were not pie-shaped; but a similar principle of land division nonetheless prevailed. Formerly the bush and fishing grounds in the vicinity of each site occupied by a clan-hamlet, its jungle fruits, garden lands, and other resources belonged to the hamlet. Each household within a clan-hamlet had the use of a piece of the hamlet's garden lands and all the households of the hamlet together had access to the hamlet's bush and fishing grounds.

After the establishment of coast villages, the bush and fishing grounds belonging to the clans of a village were used in common by the whole village group, but the ancient division of garden lands by clans and households persisted. Furthermore, certain clans or villages claim ownership of one or more of the small uninhabited limestone islands in the community. For example, Naivotavota clan of Nggalinggali village on Kambara claims the island of Wangava and its members supplement the crops they raise on their meager garden lands on Kambara with those they raise on Wangava, and also use Wangava's rather extensive forest and lake products. Undu village on Kambara claims ownership of the island of Marambo and uses its resources. Indeed, all the uninhabited islands of the community are claimed and used to supplement the resources of the owning groups. Thus the land use system of Lau is closely related to the basic ecological arrangement of the area and functions to insure a balanced distribution of various types of island resources among the local groups of each island and to render accessible to each household means of obtaining a balanced daily diet.

[18] For details *see* Thompson, 1940a, 1940b.

[19] Except Tokalau and Lomatchi located on Kambara's leeward shore near the anchorage.

The traditional diet was further safeguarded by an ingenious and self-regulating system of co-operative production and distribution, which encompassed all the local groups in the community. On each inhabited island an hereditary officer called the *vaka vanua* is custodian of the jungle fruits and crops. The traditional role of the crop custodian was to watch the island's food supply and, as each major food crop (whether wild or cultivated) matured, to place a tabu on it. When the custodian considered the crop under tabu to have ripened sufficiently, his traditional role was to remove the tabu and to arrange for the collection of first fruits by village and clan groups. The first fruits were then placed on the village ceremonial ground (*rara*) and divided by the custodian into two portions, one for the island chief and one for the people. The chief's portion was presented to the chief ceremonially by the custodian or by another officer of the aboriginal class, called the *takala*. The portion of the first fruits reserved for the people was divided by still another officer, called the headman of the ceremonial ground (*tui rara*),[20] a title hereditary in an aboriginal clan. It was the responsibility of this official to divide the food so that each clan received a fair share. When crops were abundant, part of the first fruits were set aside to be fermented and stored against time of scarcity. After the first fruits ceremony the people of the island were free to gather the remainder of the crop, each group from its own lands.

In this island community where food was none too plentiful and famine a constant threat, the institution of the crop custodian functioned, in total context, to conserve and augment the food supply of each island by preventing the crops from being consumed before they had attained their full size and maturity and their highest nutritive value. It thus served as a public health and resources conservation measure of considerable significance to guard against famine, to obtain the optimum size and food value of the crops, to insure a more equitable distribution of the limited food resources of the community as a whole, to build up community health through more adequate nutrition, and to accumulate a surplus in times of plenty for use in times of scarcity. It should be noted that on each island only the major food crops were placed under tabu. These differed from island to island and from season to season, depending on local conditions as judged by crop custodians, and thus the custodian institution had considerable flexibility.

When the British system of indirect rule was established in Lau, however, the office of crop custodian was not incorporated into the administrative set-up. Indeed, its very existence was probably unknown to Europeans. Moreover, the Lauans soon became confused as to which chief should receive the offering of first fruits—the traditional island chief, whose office had not been recognized officially in the new government system, or the local village chief, an

[20] The *tui rara's* functions were performed on Fulanga by the *tui naro*, an aboriginal clan title.

officer newly created by British regulation. Consequently the crop custodian, although continuing to function in a limited way on all the inhabited islands of the community (except Namuka where the crops abundantly cover the needs of the population), has lost considerable authority and prestige. The number of fruit and garden crops placed under tabu for first fruits presentation has decreased in number, at least part of each crop being consumed before it has fully matured, especially on the limestone islands. Food is rarely stored against time of famine, and in general the crops are smaller in size than formerly and less valuable from the viewpoint of nutrition.

As part of the production and distribution system mentioned above, each inhabited island also had a master fisherman (called *ndau ni nggoli*), who had charge of all the island's fishing grounds, communal fishing expeditions and turtle hunts. The office of master fisherman is held by a clan belonging to the noble class, except on islands where that class is absent. The traditional role of the *ndau ni nggoli* was to master the fish lore and fishing techniques of the island and to study the habits of various edible species of marine life in relation to the local fishing grounds, the tide and currents, the weather, the lunar cycle, the seasons, and the presence of noxious plants which render edible species poisonous to man. Although men and women caught fish offshore singly or in groups of two or three by means of nets, lines, and spears for their daily household needs without special permission from the master fisherman, they observed his regulation of the fishing grounds and no large, organized fishing expeditions took place without his sanction. Indeed, the master fisherman himself organized and led all communal turtle hunts and most large fishing parties. Women's communal fishing was led by the wife or daughter of the *ndau ni nggoli*.

The institution of the master fisherman functioned to increase the total catch by protecting the local fishing grounds from over-fishing and undue disturbance, and by taking advantage of the various group-fishing techniques in relation to the weather, the seasons, and the habits of various edible species. In a community where fishing provided the major protein constituent in the daily diet and an indispensable part of every feast, this institution operated as a public health measure of prime importance in creating and maintaining a balanced relation between the community and its marine food supply. The traditional functions of this institution and its ecological significance are clarified by the fact that, although the prestige and authority of the master fisherman have not been reinforced by the British and consequently this native official has lost status, he still operates unofficially to a limited extent on every inhabited island in the community. As a result of his lowered status and decreased power, however, informants say that the fishing grounds of the various islands are more disturbed than formerly, that there are fewer organized fishing expeditions, and that the catches are smaller than they used to be.

Another institution which is part of the total system under discussion is the intervillage ceremonial exchange, called *solevu*. Food from the volcanic islands is exchanged for craft goods such as mats, barkcloth, wooden bowls and canoes from the limestone islands, by means of the *solevu*, a complicated pattern of exchange between related villages based on an adaptation of the ancient ceremony used in the presentation of first fruits, mentioned above. Along with the public ceremonial exchange of goods between the two participating villages, there occurs during the four days of the *solevu* a certain amount of private exchange of gifts and barter between related individuals from the two villages. This gives a high degree of flexibility to the arrangement. The *solevu* also provides an occasion for the exchange of feasts, dances, and songs between the two groups and for intervillage games and sports.

The institution of the *solevu* functions not only to provide a pleasant interlude in the daily routine of hard work necessary to group survival in southern Lau, but also as an efficient and self-regulatory "mechanism" to stimulate production of food and craft articles and to expand the system of distribution of each island to include a group of both limestone and volcanic islands whose complementary resources form a natural trade area. We have noted how the institutions of the crop custodian and the master fisherman, in the ecological context of each island, function traditionally to increase in size and nutritive value the local food supply and operate toward its more equitable distribution. We now observe that the *solevu* provides an integrating, logical link in the total productive and distributive system which unites the various islands of the community into a balanced, interdependent and co-operative whole whereby sectional differences in resources are transformed into assets and each group, regardless of its resources, is enabled to obtain what it needs for a balanced diet and economy.

The importance of the *solevu* in the total economy of southern Lau is brought into relief by the effect of its prohibition by the Colonial Government. Some years ago British officials outlawed large ceremonial exchanges in Fiji, because, it was said, they thought such a prohibition would prevent waste of needed energy and resources. Doubtless, in other parts of Fiji, where food is more plentiful, there was a wastage of resources in connection with the *solevu*. The effect of the regulation in the community under consideration, however, was not to abolish the *solevu* but rather to reduce the number of *solevus* held in the area. This in turn tended to reduce the output of craft goods, especially mats and barkcloth, the main *solevu* craft goods. According to the local division of labor, mats and barkcloth are made by the women, who also tend the babies, care for the houses, and, as noted above, procure and prepare part of the food. The men, on the other hand, besides their food producing and cooking functions already noted, hunt and fish with spears, care for the pigs, build and sail large sea-going canoes, trade between islands, and produce wooden bowls and

sennit. This nice balance of labor between the sexes in Lau has been disturbed by the diminution in the production of women's crafts, due mainly to the government's prohibition of the *solevu*, the women being left with a considerable amount of time on their hands which they formerly used in creative activity. The men, on the other hand, tend to labor more than ever, trying to compensate for the diminished food supply. But since garden lands are insufficient in quantity and quality on most islands to cover the needs of the population without importing food, regardless of the amount of energy expended in gardening by native methods, food is scarcer than ever. It should be added that, although the supply of hardwoods, found only on the limestones, is limited, there seems to be little danger that the forests will be depleted by the small amount of timber cut for canoes and craft goods by means of native technology. Thus, instead of operating to prevent wastage of energy and resources, the prohibition of the *solevu* actually operates toward throwing out of line the nicely adjusted system of food production and distribution and the balanced sexual division of labor in the community, reducing the work and creativity of the women, increasing the work of the men, and engendering a food shortage on many of the islands.

The entire system of production and distribution described above, it should be noted, is basically accommodative and co-operative, and it is effected with a minimum of coercion, since rewards in the form of group prestige go automatically to the group (and incidentally also to the individual) who willingly gives or contributes most to the whole. Stinginess means loss of prestige. Within the system, however, rivalry between groups functions as a creative stimulus toward the goal of increased production of high quality products and more equitable distribution of these to the whole community. Apparently it is an indispensable ingredient contributing toward the self-maintenance and self-regulation of the system. Moreover, institutionalized, competitive group-giving prevents the development of an economic monopoly which might otherwise emerge in an area where the distribution of local resources is irregular and where rank and status are highly developed. Under it not even the chiefs may keep their tribute but rather, under penalty of losing face, must redistribute it to their followers. Thus, traditionally, the system prevents the accumulation of wealth in the hands of any one group or individual, and it insures that community resources will remain available to the whole group for immediate use according to need.

Before concluding we should note one more point which is vital to an understanding of the Lauan system of production and distribution described above. Despite its fine adjustment to the ecological setting and its basically self-perpetuating nature, this system could not operate effectively unless it were counterbalanced by a psychocultural arrangement which functioned to regulate and limit the size of the human population in relation to the resources of

the community made available by the indigeneous technology. Analyzing Lauan culture from this viewpoint, we find a complementary set of institutions which do actually tend to function toward just this end.

For example, after the birth of a child the father moves out of the family dwelling and sleeps in the men's house of the clan. He is not allowed to have sexual intercourse with his wife until the baby is weaned, a period of from nine months to two years. The strict observance of this custom is attested by the fact that siblings in Lau are almost without exception at least eighteen months apart. Thus the men's house complex, correlated with certain tabus, functions as a means of birth spacing and population control and of protecting maternal and infant health. Ritual continence was practiced in Lau on many occasions. Several methods of abortion were used, mainly by unmarried mothers. In Fulanga old people who had outlived their usefulness, according to native standards, were formerly abandoned on a small island in the lagoon. Where chieftainship was highly developed, those who broke tabus concerning the nobility were clubbed to death. Raiding between villages, in the course of which men, women and children were killed, was not infrequent in the group, and those who were captured, regardless of age or sex, were consumed by the victors at cannibalistic feasts. These are some of the Lauan practices which, together with accidents, hurricanes, disease, and a rate of infant and maternal mortality which was probably rather high, tended to limit the size of the population in relation to the available resources within the natural and cultural setting. Although in historic times Fijian population totals were greatly reduced, especially by the ravages of white man's diseases, the low point was reached at about 1911. Thereafter the trend has been slowly upward. The population of southern Lau gained 155 per 1,000 between 1921 and 1935.[21] At the time of the present field work, the population of the community was about 1,500.

Certain significant generalizations which grow out of the foregoing analysis may now be formulated.

We noted that in our island community a unique and balanced biotic system developed in isolation over a very long period of time and in the absence of large land animals. The advent of man, which occurred relatively late in the ecological developmental sequence, introduced not only a new species, namely *Homo sapiens*, into this natural community but also other fauna and flora, as well as the artifacts carried by man as part of his cultural equipment. Still more important, perhaps, it added human cultural processes to the fundamental ecological processes already operating in the area. In a relatively short time, from the eco-historical viewpoint, there emerged, on the basis of the ancient biotics, a new eco-cultural structure which involved plants, animals

[21] For details *see* Thompson, 1940a, p. 137.

and human groups in a mutually interdependent and balanced web of life. And whereas formerly each island had formed an independent natural community, the new eco-cultural arrangement, including man, extended over several islands, and related a number of heretofore disparate communities.

Certain ecologically significant structures of the human culture which developed in this extended island community were analyzed, namely the system of production and distribution in relation to population controls. Its foundation in the self-selected, balanced diet of the human group was noted. The findings suggest that, although certain of its activities may be harmful to the whole arrangement, the human group has tended to organize and integrate its habits of feeling, thought, and behavior systematically with the world of nature in such a way as to play a basically *positive* and *logical* role in the multi-dimensional process of attaining and maintaining a balanced, healthy adjustment of the whole community. The findings also suggest that its major economic institutions are basically accommodative and co-operative, with competitive attitudes and arrangements serving as an essential dynamic toward its self-maintenance and toward the development of a high standard of production and a high degree of creativity.

It is well known that isolated natural communities tend in time, by processes of symbiosis, accommodation and competition, to develop a delicately balanced, ecological organization wherein the various species of flora and fauna attain a mutually advantageous adjustment within the total environment. Ordinarily we think of the process mainly in terms of plants and animals in relation to the geological structure, climate, soil, water supply and other features of the physical environment. However, a broad-gauged analysis of the available data from this remote, relatively isolated community (where geological and ecological processes have proceeded for millennia relatively undisturbed and where cultural processes have operated for centuries with little interference from without) suggests that all of life is involved in a self-regulating web of relationships, human groups as well as so-called lower animals and plants. Seen as a whole, a natural community actually consists of its total population—plants, animals and human beings—in a complex, mutually interdependent relationship in environmental context.

The analysis indicates, however, that the dynamic, total ecological structure of a community emerges only if processes whose time-span is relatively long are taken into account. But such long-phase processes tend to escape the attention of scientists for many reasons, including the limitations of most frames of reference currently in vogue; the habit of observing only short-phase processes; the habit of concentrating on one dimension of the nature or culture process and even on one limited aspect of that one dimension; and the habit of working independently rather than as part of a multiple-discipline, co-operative group.

Our data suggest further that, once firmly established and embodied in the symbol system, the attitudes and the habits of a human community, a balanced, functional, eco-cultural structure tends to endure if the human community is not wiped out or severed from its natural setting. The data also suggest that such an eco-cultural community structure is the living core of relationships which the human group, either consciously or unconsciously, tries in multiple ways to perpetuate. An understanding of this core may be expected to throw light on the problem of so-called "cultural resistance," or a people's acceptance or rejection of certain extraneous patterns of belief, thought and behavior. For example, in Lau the community has tended to reject foreign patterns of feeling, thought and behavior which interfere with, or break down, its basic eco-cultural structure, regardless of the regulations or the penalties involved. It would seem that to the extent the Lauans have been unsuccessful in their resistance to harmful interference with their group life processes, the intentional or forced introduction of nonfunctional patterns or the prohibition of functional ones has tended to throw off balance the community's whole eco-cultural structure and has operated directly against its well-being. The implications that these findings have for the problem of prediction in social science are manifold.

Finally, the findings point up the practical significance of the eco-cultural approach and suggest that an understanding of a community's long-time, dynamic pattern of relationships is basic to the formulation of adequate norms or standards for the advancement of community welfare and for the development of community-oriented government administration.[22] Accordingly, the significant problem regarding community welfare and the conservation of resources does not emerge simply as the question of how human health and institutions may be improved, or of how topsoil may be saved, or watersheds, and forest land protected, or organic species preserved from extinction, important though each of these aspects may be. The significant problem of community welfare emerges as a matter of using and adapting local beliefs, attitudes, habits and institutions, supplemented where necessary by appropriate new ones, to the end that human groups, through natural eco-cultural processes, may foster the development and maintenance of a balanced, healthy *total* community—plants and animals, as well as human groups.

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[22] *See* Thompson, 1949.

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